Glossary

25 Year, 24 Hour Storm Event: The rainfall event with a probable recurrence interval of once in 25 years with a duration of 24 hours, as defined by the National Weather Service in technical Paper Number 40, "Rainfall Frequency Atlas of the United States:, May 1961, and subsequent amendments.

Aerobic Bacteria: Bacteria living in the presence of free oxygen.

Aerobic: Living, active, or occurring only in the presence of free oxygen.

AgSTAR: A voluntary federal program that encourages the use of effective technologies to capture methane gas, generated from the decomposition of animal manure, for use as an energy resource.

Ally: Companies in the agricultural and energy industries that assist AgSTAR Partners by developing and distributing up-to-date technology for methane recovery systems.

Anaerobic: Living, active, or occurring in the absence of free oxygen.

Anaerobic Bacteria: Bacteria living in the absence of free oxygen.

Anaerobic Lagoon: An anaerobic lagoon is designed to biologically stabilize manure.

Bacteria: Unicellular microorganisms occurring in a wide variety of forms and having a wide range of properties. Aerobic bacteria live in the presence of free oxygen; anaerobic bacteria live in an oxygen-free environment. Methanogenic bacteria are anaerobic and produce methane as part of their normal function.

Barn: A barn where animals are housed for all or part of the day.

Best Management Practice (BMP): A practice or combination of practices found to be the most effective, practicable (including economic and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

Biogas: The gas produced as a by-product of the anaerobic decomposition of livestock manure. Biogas consists of about 60-80% methane, 30-40% carbon dioxide, and trace amounts of other gases (e.g., hydrogen sulfide).

Biomass: The total amount of living material, plants and animals, above and below ground in a particular area.

Boar: An uncastrated male swine animal of any age. Mature boars should always be stagged and fed a month longer before being sent to market.

BTU: British Thermal Unit (BTU) is a measure of the heat content. One BTU is the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. The energy value of biogas is often expressed in terms of BTU. One cubic foot of biogas contains about 600-800 BTU of energy. By comparison, one cubic foot of natural gas contains about 1000 BTU.

Bull: A mature (approximately 24 months of age or older) uncastrated, male bovine. However, any mature, castrated, male bovine which has

developed or begun to develop the secondary physical characteristics of a castrated male may also be considered a bull.

Calf: An immature male or female bovine which has not developed the physical characteristics typical of mature cows or bulls.

Carbohydrates: Any of various compounds of carbon, hydrogen, and oxygen (e.g., sugars, starches, and celluloses) which are generally formed by green plants. Carbohydrates constitute a major class of animal feed and are a major component of livestock manure.

Climate Change Action Plan: Plan initiated by the United States in October 1993 which takes measures in all sectors of economy that emit greenhouse gases while guiding the U.S. economy toward environmentally sound economic growth.

Complete Mix Digester: A controlled temperature, constant volume, mechanically mixed vessel designed to maximize biological treatment, methane production, and odor control as part of a manure management facility with methane recovery.

Composting: A process of aerobic biological decomposition characterized by elevated temperatures that, when complete, results in a material that is biologically stable, safe, and makes an excellent soil conditioner.

Confine: A confinement facility for swine animals.

Corral: An enclosed, unpaved area where animals can move freely.

Cover Fraction: The fraction of the lagoon (0-100%) which is covered by an impermeable gas- and air-tight cover.

Covered Lagoon Digester: An anaerobic lagoon fixed with an impermeable, gas- and air-tight cover designed to decomposed manure and produce methane.

Cow-Dry: A female bovine that has developed through reproduction or with age, the relatively prominent hips, large middle, and other physical characteristics typical of mature females. Cow-Dry includes those mature females which are not currently lactating.

Cow-Lac: A female bovine that has developed through reproduction or with age, the relatively prominent hips, large middle, and other physical characteristics typical of mature females. Cow-Lac includes those mature females which are currently lactating.

Dairy-Drylot: A dairy farm where animals are managed primarily in an open drylot except during milking.

Dairy-Free Stall: A dairy farm where animals are managed in individual open stalls and are free to roam around.

Dairy-Tie Stall: A dairy farm where animals are confined to stalls and each cow is individually tied with a strap or chain.

DDB Depreciation: Double declining balance (DDB) depreciation is an accelerated depreciation method in which first year depreciation is double the amount

of straight-line depreciation.

Demand charge: The peak kW demand during any quarter hour interval multiplied by the demand charge rate.

Digester: A concrete vessel used for the biological, physical, or chemical breakdown of livestock and poultry manure.

Discount rate: The interest rate used to convert future payments into present values.

Downpayment: The initial amount paid at the time of purchase or construction expressed as a percent of the total initial cost.

Drylot: An enclosed, unpaved area where the animals can move about freely and where they can feed along a feed apron.

Drystack: Solid or dry manure that is scraped from a barn, feedlane, drylot or other similar surface and stored in a pile until it can be utilized.

Effluent: The liquid discharge of a manure treatment process.

Endorsers: Professional and trade associations, colleges and universities, institutions, and societies who support AgSTAR and encourage the use of renewable energy sources.

Energy Charge: The energy charge rate times the total kWh of electricity used.

Facultative: Living, active, or occurring in the presence or absence of free oxygen.

Facultative Bacteria: Bacteria living in the presence or absence of free oxygen. Facultative bacteria are important in the decomposition of manure.

FarmWare: A computerized decision support system which allows the evaluation of the costs and benefits of AgSTAR methane recovery systems.

Fats: Any of numerous compounds of carbon, hydrogen, and oxygen that are glycerides of fatty acids, the chief constituents of plant and animal fat, and a major class of energy-rich food. Fats constitute animal feed and are a major component of livestock manure.

Feed Apron: A paved or hard surface along one side of a drylot where feed is provided to the animals.

Finisher: A swine animal finished for market.

Flushing System: A manure collection system that collects and transports manure using water.

Freeboard: The distance between the highest possible wastewater level in a manure storage/treatment structure and the top of the structure. Freeboard is an important design parameter in designing lagoons, ponds, storage basins, digesters, and other manure storage and treatment structures.

Free Stall Barn: A barn where animals can move about freely.

Gilt: A female swine that has not produced pigs and has not reached an evident stage of pregnancy.

evident stage of pregnancy.

Greenhouse Gas: An atmospheric gas which is transparent to incoming solar radiation but absorbs the infrared radiation emitted by the Earth's surface. The principal greenhouse gases are carbon dioxide, methane, and CFCs.

Grower: An immature male or female swine animal managed between weaning and finishing weights.

Heifer: An immature female bovine that has not developed the physical characteristics typical of cows and has not yet produced offspring.

Hydraulic Retention Time (HRT): The average length of time any particle of manure remains in a manure treatment or storage structure. The HRT is an important design parameter for treatment lagoons, covered lagoon digesters, complete mix digesters, and plug flow digesters.

Inflation Rate: The annual rate of increase in costs or sales prices in percent.

Influent: The liquid and manure entering a manure treatment facility.

Internal Rate of Return (IRR): The discount rate which makes the NPV of an income stream equal to zero.

Kilowatt (kW): One kilowatt (kW) is equal to 1000 watts or the absolute meter kilogram per second unit of power equal to the work done at the rate of one absolute joule per second or to the rate of work represented by a current of one ampere under a pressure of one volt and taken as the standard in the United States.

Kilowatt Hour (kWh): A unit of work or energy equal to that expended by one kilowatt in one hour or to 3.6 million joules.

Lagoon: An impoundment made by excavation or earthfill for biological treatment of animal manure. Lagoons can be aerobic, anaerobic, or facultative, depending on their loading and design.

Land Application: Application of manure to land for reuse of the nutrients and organic matter for their fertilizer value.

Liquid Systems: Manure handling system having a total solids content less than about 4%.

Loading Rate: A measure of the rate of volatile solids (VS) entry into a manure management facility with methane recovery. Loading rate is often expressed as pounds of VS/1000 cubic feet.

Loan Rate: The percent of the total loan amount paid per year.

Manure: The fecal and urinary excretions of livestock and poultry.

Marginal Tax Rate: The percent of the methane recovery project net income to be paid in taxes.

Memorandum of Understanding (MOU): An agreement between AgSTAR Partners, Allies, and Endorsers and the EPA stating the responsibilities and commitments agreed to by both parties.

both parties.

Mesophilic: Of, relating to, or being at a moderate temperature (20-45°C).

Methane: A colorless, odorless, flammable gaseous hydrocarbon that is a product of the decomposition of organic mater. Methane is a major greenhouse gas. Methane is also the principal component of natural gas.

Methane Project Lifetime: The period of time during which the project is installed and completely paid for.

Methane Recovery Lagoon: Methane recovery lagoon has a constant volume primary treatment lagoon and a secondary storage structure to hold wastewater and/or runoff until it can be utilized.

Minimum Treatment Volume: The minimum volume needed to store the manure influent for the designated HRT or loading rate.

Mix Tank: A control point where manure is collected and added to water or dry manure to achieve the required solids content for a complete mix or plug flow digester.

Natural Gas: A combustible mixture of methane and other hydrocarbons used chiefly as a fuel.

Net Present Value (NPV): The present value of all cash inflows and outflows of a project at a given discount rate over the life of the project.

Nonpoint Source Pollution: Pollution entering a water body from a broad diffuse area.

NPV Payback: The number of years it takes to pay back the capital cost of a project calculated with discounted future revenues and costs. Profitable projects will have an NPV Payback value less than or equal to the lifetime of the project.

Nursery: An immature male or female swine animal managed between birth and growing/finishing.

Nutrients: Elements required for plant or animal growth, including the macronutrients (nitrogen, phosphorus, and potassium), which are the major nutrients required and micronutrients, which include a number of other elements that are essential but needed in lesser amounts.

Operating Volume: The volume of the lagoon needed to hold and treat the manure influent and the rain-evap volume.

Paddock: An enclosed area where the animals can roam freely.

Parlor: Facility where lactating cows are managed before, during, and after milking.

Partner: A livestock producer who signs a Memorandum of Understanding (MOU) with the U.S. EPA and agrees to survey his/her facility and install methane recovery systems where profitable within 3 years.

Pasture: An open area where the animals may roam freely.

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Payback Years: The number of years it takes to pay back the capital cost of a project.

pH: A measure of acidity or alkalinity. The pH scale ranges from zero to 14, with a value of 7 considered neutral. The lower a value, the higher the acidity, and the higher the value, the higher the alkalinity.

Piglet: A newborn pig.

Plug Flow Digester: A constant volume, flow-through, controlled temperature biological treatment unit designed to maximize biological treatment, methane production, and odor control as part of a manure management facility with methane recovery.

Point Source Pollution: Pollution entering a water body from a discrete conveyance such as a pipe or ditch.

Process Water: Water used in the normal operation of a livestock farm. Process water includes all sources of water that may need to be managed in the farm's manure management system.

Proteins: Any of numerous naturally occurring extremely complex combinations of amino acids containing the elements carbon, hydrogen, nitrogen, and oxygen. Proteins constitute a major portion of animal feed and are major components of livestock manure.

Psychrophilic: Of, relating to, or being at a relatively low temperature (<20°C).

Pull Plug Pit: A series of one or more pits where manure is collected until it is utilized or transferred to a storage or treatment structure.

Rain-Evap Volume: The volume of the lagoon needed to hold the average rainfall on the surface and any watershed runoff minus the average evaporation at the surface.

Scrape System: Collection method that uses a mechanical or other device to regularly remove manure from barns, confine buildings, drylots, or other similar areas where manure is deposited.

Section 29 Tax Credit: The Section 29 Biomass Gas Credit is a credit of $3.00 per 5.8 million BTUs. This tax credit is applicable to the production and sale of synthetic fuels from coal or gas from biomass (i.e., thermal or combustion type gasifiers, landfill gas facilities, and anaerobic digesters) to an unrelated party.

Separator: A mechanical device or gravity facility that separates solid and fibrous material in the manure from the liquid portion.

Settling Basin: A basin designed to separate solid and fibrous material in the manure from the liquid portion.

Sideslope: The slope of a lagoon embankment, often expressed as the ratio of the horizontal displacement and vertical displacement.

Simple Payback: The number of years it takes to pay back the capital cost of a project calculated without discounting future revenues or costs.

calculated without discounting future revenues or costs.

Sludge Volume: Volume to allow for sludge accumulation in a manure storage or treatment structure. Sludge volume is an important design parameter for manure storage and treatment structures.

Slurry Systems: Manure handling system having a total solids content between 4% and 12%.

Solids Systems: Manure handling system having a total solids content greater than about 12%.

Sow: A female swine that shows evidence of having produced pigs or is in an evident stage of pregnancy.

Storage Pond: An earthen basin designed to store manure and wastewater until it can be utilized. Storage ponds are not designed to treat manure.

Storage Tank: A concrete or metal tank designed to store manure and wastewater until it can be utilized. Storage tanks are not designed to treat manure.

Storm Runoff: Manure contaminated rainfall which must be stored and utilized on the farm and may not e discharged into rivers, streams, lakes, or other bodies of water.

Straight-Line Depreciation: Depreciation per year equals the total facility cost divided by the years of depreciation (usually the facility lifetime).

Swine-Farrow to Finish: A swine farm where pigs are farrowed, nursed, weaned, started or grown, and finished to market weight at the same site.

Swine-Farrow to Nursery: A swine farm where pigs are farrowed and nursed before being sent to a grower or finishing facility

Swine-Farrow to Grower: A swine farm where pigs are farrowed, nursed, weaned, and started or grown before being sent to a separate finishing unit.

Swine-Finisher: A swine farm where pigs are finished to market weight.

Supplemental Heat: Additional heat added to complete mix and plug flow digester to maintain a constant operating temperature at which maximum biological treatment may occur.

SYD Depreciation: Sum of Years' Digits (SYD) is a common accelerated depreciation method where the sum of the digits is the total of the numbers representing the years of depreciation (usually the facility lifetime).

Thermophilic: Of, relating to, or being at a relatively high temperature (45-60°C).

Tie Stall Barn: A barn where animals are kept in stanchions and cannot move about freely.

Total Solids: The total amount of solids in manure, both in solution and suspension.

TS Percent (TS%): The fraction of the total weight of the manure or wastewater which is solid. TS% is an important factor to consider when designing a ma-

solid. TS% is an important factor to consider when designing a manure treatment facility.

Utility Intertie: The method of utilizing electricity produced from manure management facilities. Options include either (1) on farm first use then sale to utility or (2) sale to the utility then direct purchase.

Volatile Solids: The organic fraction of the total solids. Methane production is often expressed in terms of cubic of biogas per pound of volatile solids (VS).

Volatilization: The loss of gaseous components, such as ammonium nitrogen, from animal manure.

Watershed: A facility of berms, channels, or other devices to collect and hold manure contaminated runoff for up to a 25yr-24 hr storm event.

Withdrawal Schedule: The fraction of the treated manure and water effluent that is withdrawn from the effluent storage facility each month.